

## Supporting Information

2 Declining mercury concentrations in bluefin tuna reflect reduced emissions to the North

3 Atlantic Ocean

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7 The Supporting Information includes an additional 12 pages, 4 tables, and 5 figures

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10 **Table S1. Age groups and their corresponding size ranges**

<b>Rounded Age</b>	<b>Estimated age range</b>	<b>Actual size range</b>
<b>y</b>	<b>y</b>	<b>cm</b>
9	8.50 ~ 9.49	178.1 ~ 192.8
10	9.50 ~ 10.49	192.9 ~ 205.7
11	10.50 ~ 11.49	205.8 ~ 216.6
12	11.50 ~ 12.49	216.7 ~ 225.7
13	12.50 ~ 13.49	225.8 ~ 233.5
14	13.50 ~ 14.49	233.6 ~ 240.3

11  
12 Approximate age was estimated from body length using an empirical growth curve  
13 generated from direct age-length observations from otoliths and modal progression data<sup>1</sup>  
14

15 **Table S2. Result of the least squares regression analysis in each age group**

## 16 Linear Model

<b>Age group</b>	<b>n</b>	<b>r<sup>2</sup></b>	<b>p value</b>	<b>Slope</b>	<b>Upper 95%</b>	<b>Lower 95%</b>
9	238	0.185	<0.001	-0.020	-0.025	-0.014
10	249	0.109	<0.001	-0.020	-0.027	-0.013
11	197	0.122	<0.001	-0.017	-0.023	-0.010
12	137	0.122	<0.001	-0.019	-0.028	-0.010
13	94	0.050	0.031	-0.012	-0.023	-0.001
14	78	0.085	<0.001	-0.023	-0.040	-0.006
Pooled slope	993	0.332	<0.001	-0.018	-0.021	-0.015
Pooled slope (bootstrap)	993	-	-	-0.018	-0.022	-0.015

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## 18 Log-Linear Model

<b>Age group</b>	<b>n</b>	<b>r<sup>2</sup></b>	<b>p value</b>	<b>Slope</b>	<b>Upper 95%</b>	<b>Lower 95%</b>
9	238	0.181	<0.001	-0.035	-0.025	-0.044
10	249	0.100	<0.001	-0.027	-0.017	-0.037
11	197	0.115	<0.001	-0.023	-0.014	-0.032
12	137	0.119	<0.001	-0.024	-0.013	-0.035
13	94	0.050	0.030	-0.016	-0.002	-0.030
14	78	0.088	<0.001	-0.026	-0.007	-0.045
Pooled slope	993	0.350	<0.001	-0.026	-0.021	-0.030

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21 **Table S3. Preferred prey of ABFT in various ocean regions and their Hg**

22 concentrations, as reported in the literature

Prey common name	Scientific name	Region*	Hg (SD) mg kg <sup>-1</sup> ww <sup>†</sup>	Refs‡
Atlantic herring	<i>Clupea harengus</i>	WNA	0.02 (0.02)	2-4
Atlantic menhaden	<i>Brevoortia tyrannus</i>	WNA	0.01 (0.01)	3, 6
sand lance	<i>Ammodytes spp.</i>	WNA	0.04 (0.03)	2-4, 7
silver hake	<i>Merluccius bilinearis</i>	WNA	0.05 (0.05)	2-4
Atlantic mackerel	<i>Scomber scombrus</i>	WNA	0.02 (0.01)	2-4
bluefish	<i>Pomatomus saltatrix</i>	WNA	0.35 (0.02)	2-4
anchovy	<i>Engraulis encrasicolus</i>	ENA	0.03 (0.02)	7-9
myctophids	<i>Myctophidae spp.</i>	MED	0.11 (0.08)	2, 9
anchovy	<i>Engraulis encrasicolus</i>	MED	0.05 (0.01)	9-10
sardine	<i>Sardine pilchardus</i>	MED	0.09 (0.02)	9, 11
shortfin squid	<i>Illex coindetii</i>	MED	0.28 (0.15)	2, 9

23  
24 \*Regions: WNA (Western North Atlantic); ENA (Eastern North Atlantic); MED

25 (Mediterranean Sea)

26 <sup>†</sup>ww = wet weight

27 <sup>‡</sup>Refs refer to published studies that denote prey as preferred prey for ABFT and report

28 Hg concentrations for prey species.

29 **Table S4. Year-to-year comparisons of Atlantic bluefin tuna (*Thunnus thynnus*) Hg**30 **concentrations.** Total Hg data by year were compared, (a) individual and (b) family error

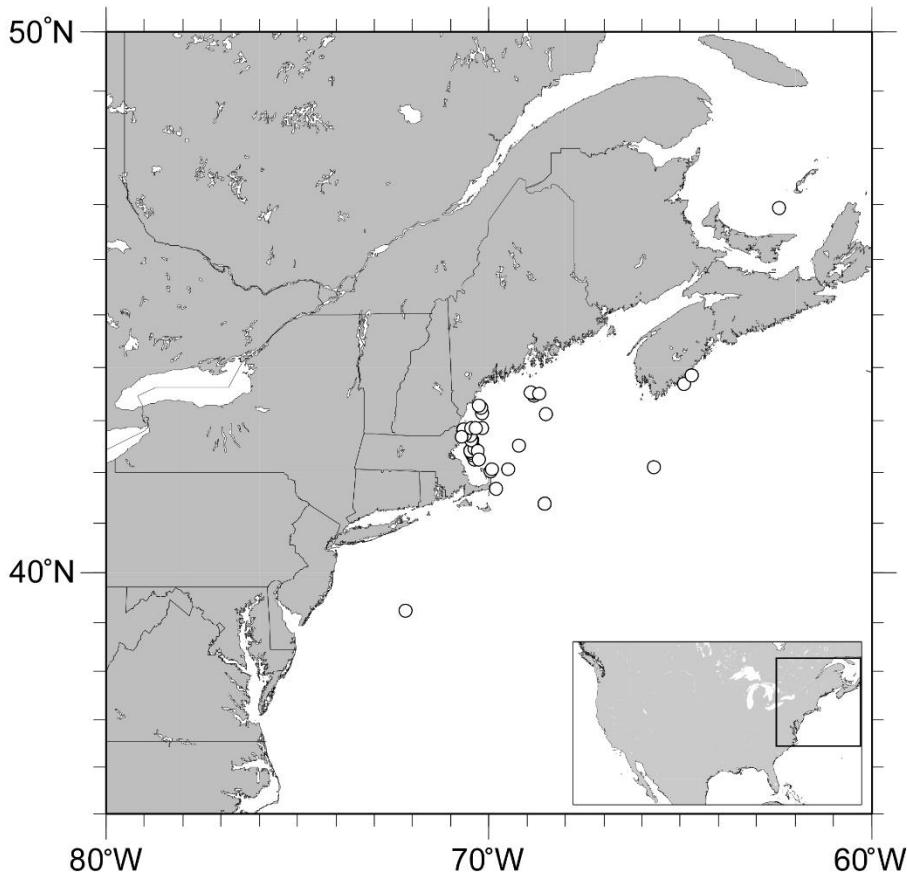
31 rate, using the non-parametric Kruskal-Wallis test.

(a)	2005	2006	2007	2008	2009	2010	2011	2012
2004	0.07	0.67	0.91	<0.001	<0.001	<0.001	<0.001	<0.001
2005		0.07	0.09	0.02	0.05	<0.001	<0.001	0.02
2006			0.64	0.001	0.003	<0.001	<0.001	<0.001
2007				<0.001	0.001	<0.001	<0.001	<0.001
2008					0.99	<0.001	<0.001	0.64
2009						<0.001	<0.001	0.71
2010							0.06	<0.001
2011								<0.001

(b)	2005	2006	2007	2008	2009	2010	2011	2012
2004	1.00	1.00	1.00	0.002	0.12	<0.001	<0.001	<0.001
2005		1.00	1.00	1.00	1.00	<0.001	<0.001	1.00
2006			1.00	0.14	0.47	<0.001	<0.001	0.11
2007				0.02	0.23	<0.001	<0.001	0.006
2008					1.00	<0.001	0.001	1.00
2009						0.004	0.10	1.00
2010							1.00	<0.001
2011								<0.001

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36 **Figure S1. Known capture locations of ABFT.** Note that several known catch locations

37 have specific region names although no specific coordinates were provided. These

38 include Stellwagen Bank, Ipswich Bay, Jeffrey's Ledge, Whaleback, and Hellhole in Gulf

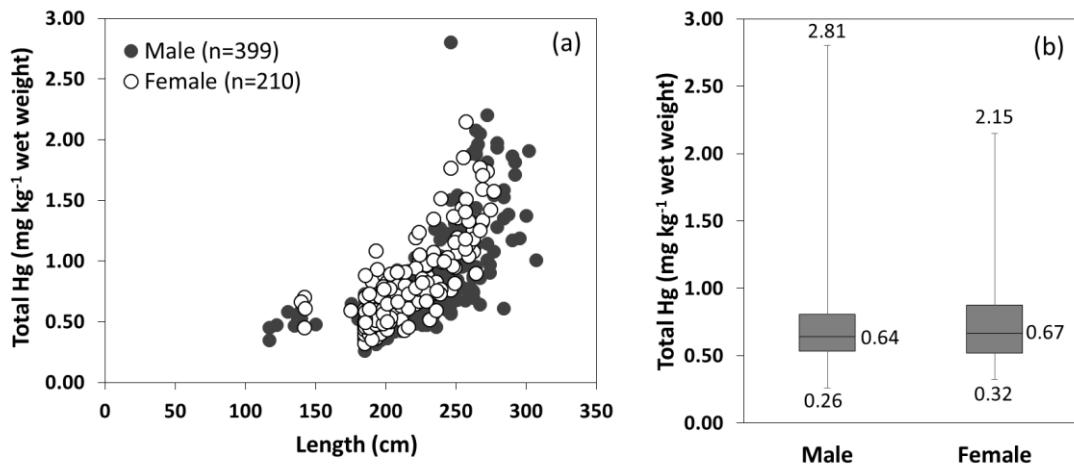
39 of Maine and Prince Edward Island in Gulf of St. Lawrence. A few ABFT were captured

40 outside the Gulf of Maine in waters off Nova Scotia and oceanic waters off the

41 Northeastern U.S. coast.

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44 **Figure S2. Comparison of Hg concentration in male and female ABFT.** (a) Total Hg

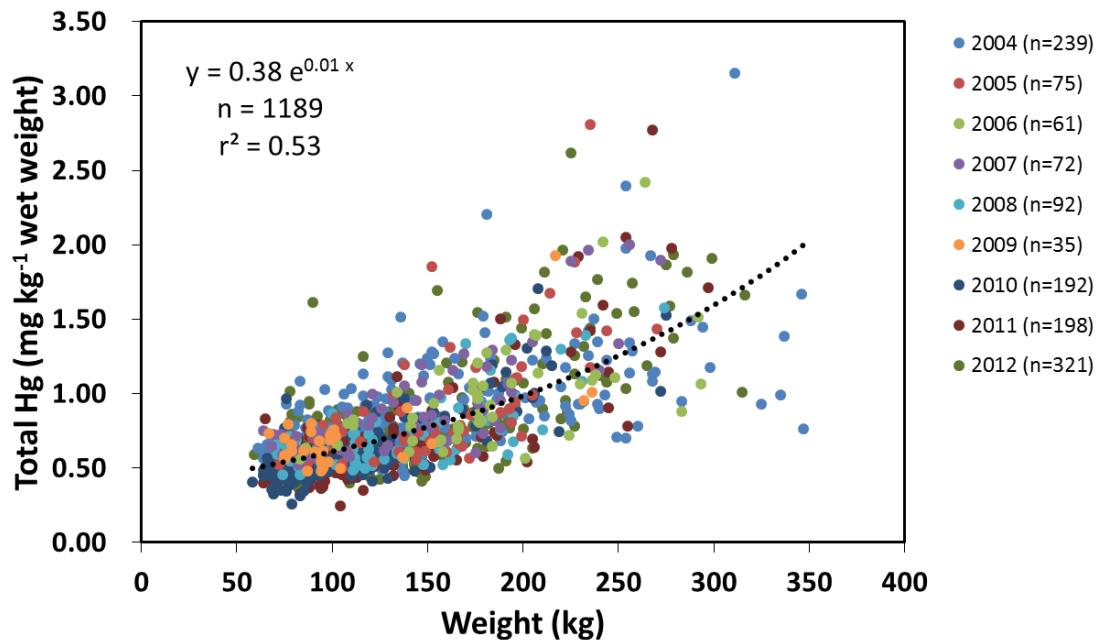
45 in male and female ABFT as a function of length (curved fork length, cm). (b) Box plot

46 of Hg in male and female ABFT with values of median, maximum and minimum.

47 Average Hg concentrations were  $0.74 \pm 0.34 \text{ mg kg}^{-1}$  in males (n=399) and  $0.76 \pm 0.33$

48  $\text{mg kg}^{-1}$  in females (n=210). Hg concentrations in males and females were not

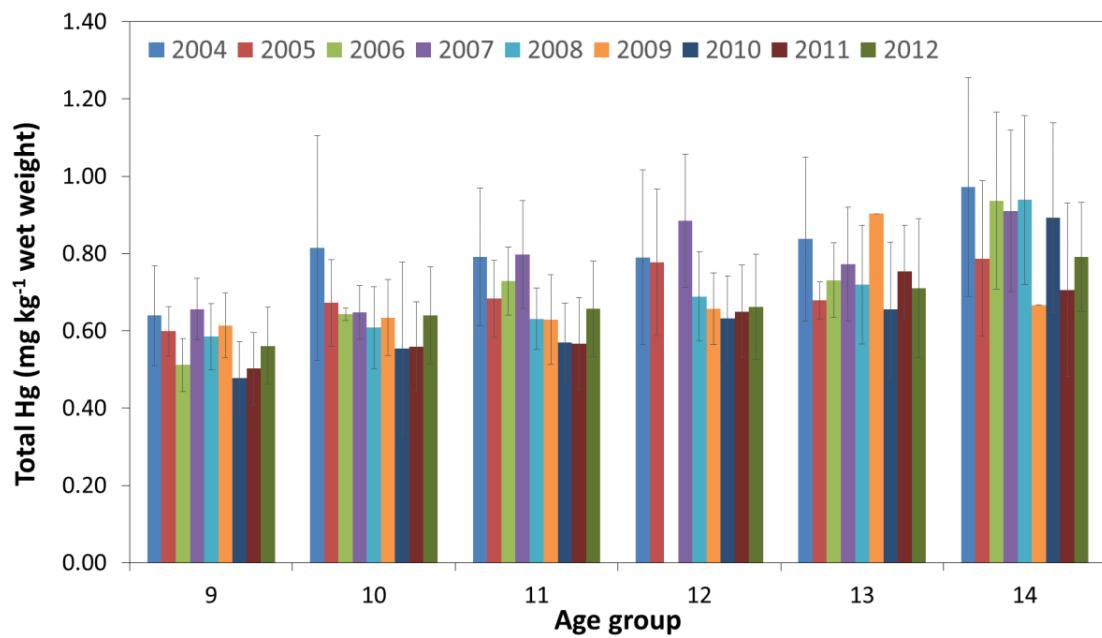
49 significantly different from one another (t-test,  $p = 0.6$ ).



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51 **Figure S3. Relationship between total Hg in ABFT and weight.** Weight here refers to  
 52 dressed weight: weight of the fish after removal of gills, viscera, head and fins. Stippled  
 53 black line shows exponential fit to data.

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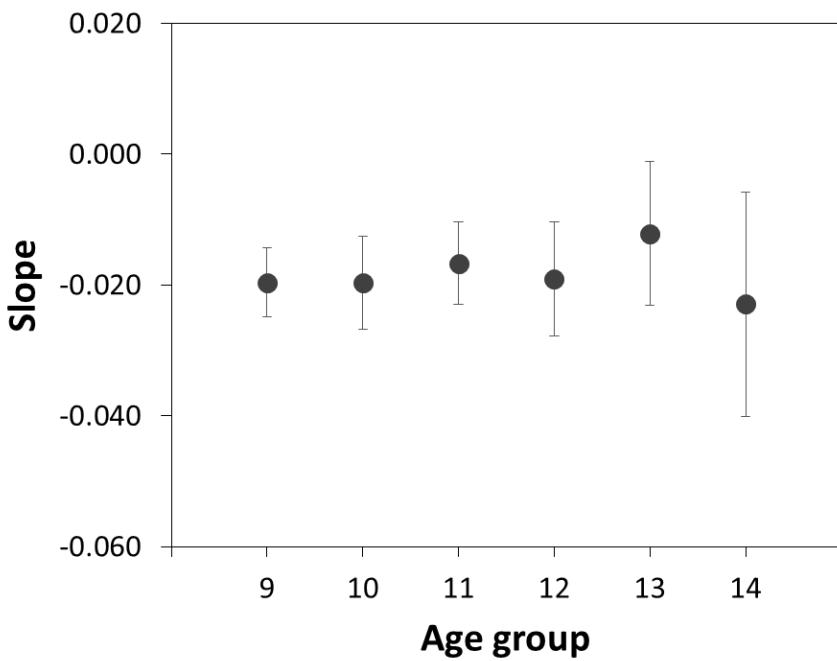
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56 **Figure S4. Total Hg in ABFT in age groups 9 to 14 years old.** Bar color indicates year

57 of capture. Error bars show  $\pm 1\text{SD}$ . Blank space in age group 12 indicates no samples

58 collected in 2006.

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61 **Figure S5. Comparison of slopes across age groups 9-14 years.** Error bars show 95%  
62 confidence interval. There were no significant differences in slope between age groups  
63 (F-test for homogeneity of regression slopes,  $p = 0.733$ ).  
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